	Acrylonitrile	Creation Date :Apr. 15. 97
		Revsion : 3
		Revsion Date : Jun. 14. 11

Ⅰ. Chemical Product and Company Identification

1. Product Name : Acrylonitrile, Inhibited
2. Chemical Formula : CH_2CHCN
3. Manufacturer/Supplier Information

   Taekwang Industrial Co., Ltd.
   162-1, 2-Ga Jangchung-Dong, Jung-Gu, Seoul, Korea.
   C.P.O BOX : 1173 Seoul
   Cable " TAE KWANG " SEOUL
   Telex " PIGEON " K28219
   Fax. 82-2-3406-0226
   Tel. 82-2-3406-0300

4. Emergency Contact Point

   - Department : Taekwang Industrial Co., Ltd. Petrochemical 3rd Plant
     Safety & Environment (S & E) Team or
     Taekwang Industrial Co., Ltd.
     Petrochemical Sales Department
   - Tel. No. : S & E Team 82-52-259-9691 or
     Sales Department 82-2-3406-0334

Ⅱ. Hazards Identification

1. Health Hazard Classification
   - Flammable liquid Category 2
   - Acute Toxicity Substance(Oral) Category 3
   - Acute Toxicity Substance(Dermal) Category 2
   - Acute Toxicity Substance(Inhalation : Vapor) Category 2
   - Skin Corrosion/Irritation Substance Category 2
   - Eye Damage/Irritation Substance Category 2A
   - Skin Sensitization Substance Category 1
   - Carcinogenicity Substance Category 1B
   - Germ Cell Mutagenicity Substance Category 2
   - Reprodctively Toxicity Substance Category 2
   - Specific Target Organ Systemic Toxicity Substance(Single Exposure)
     : Category 1 Nervous System, Kidney
   - Specific Target Organ Systemic Toxicity Substance(Single Exposure)
     : Category 3 Respiratory Tract Irritation,
   - Specific Target Organ Systemic Toxicity Substance(Single Exposure)
     : Category 3 Narcotic effects
   - Specific Target Organ Systemic Toxicity Substance(Repeated Exposure)
     : Category 1 Nerves System, Air Way, Blood System, Testis, Kidney, Liver

2. Warning

○ Danger/Hazard Symbol

○ Warning Statement

Danger !

Extremely Hazardous Liquid and Gas.

May be fatal if inhaled, swallowed or absorbed through skin.

May cause respiratory irritation and severe eye irritation.

May cause allergic skin reaction.

May cause drowsiness or dizziness.

Suspected of causing genetic defects.

May cause cancer.

Suspected of damaging fertility or the unborn child.

May cause damage to nerves system, liver.

Over-exposure and repeated exposure for acrylonitrile can result in damage of nervous system, blood system, testis, kidney, liver and intestines.

○ Precautionary Measures

- Precaution

Before Handling, You must read MSDS of acrylonitrile

You must handle Acrylonitrile after completely reading and understanding Precautionary Measures in MSDS of acrylonitrile

Keep away from heat, sparks and flame.- No Smoking

You must ground all equipment containing acrylonitrile.

Use fire-protective equipment in acrylonitrile system

You must use non-sparked tool when handling acrylonitrile.

Take static electricity preventive measure before handling acrylonitrile.

You must not breathe gas, fumes, vapor or spray of acrylonitrile.

Do not get in eyes, on skin or on clothing when handling acrylonitrile

You must wash thoroughly after handling.

You must not eat or/and drink anything or/and smoke when handling acrylonitrile.

You only must handle acrylonitrile with adequate ventilation.

In case of insufficient for ventilation, wear suitable respiratory equipment.

You must not take the contaminated clothing outside of workplace.

You must wear protective equipment including safety clothing, rubber gloves and safety goggle or face shield when handling acrylonitrile

Wear suitable protective clothing when handling acylonitrile.

- Measures

Contact the local poison center and physician immediately.
Get medical advise/attention if you feel unwell.
Administer first aid immediately.
Rinse mouse.
Remove or take off all contaminated clothing.
Clean & dry the contaminated clothing before reuse.
If swallowed, Immediately call the local poison center or doctor/physician.
If on skin, gently wash with plenty of soap and water.
If inhaled, remove victim to fresh air and keep at rest in position comfortable for breath.
If exposed or concerned, get medical advise/attention.
If skin irritation or rash occurs, get medical advise/attention.
If eye irritation persists, get medical advise/attention.
In case of fire, Use particular foam extinction chemicals, carbon dioxide, water, regular foam, alcohol resistant foam for extinction.
If swallowed, rinse mouse. Do not induce vomiting.
If on skin(or hair), remove or take off all contaminated clothing.
Rinse skin with water/shower.
If in eyes, rinse cautiously with water for several minutes. remove contact lenses. Continue rinsing.

- Storage

Store locked up.
Keep container tightly closed.
Store in well-ventilated place and keep cool.

- Dispose

Dispose of content/container in accordance with national designated waste regulation.

3. Other hazards which do not result in Classification

○ NEPA Rating(Scale 0-4)

- Heath : 4
- Fire : 3
- Reactivity : 2

Ⅲ. Composition and information on ingredient

Main Chemical

1. Chemical Name : Acrylonitrile
2. Synonym : Vinyl Cyanide, Propenitrile
3. CAS. No. : 107-13-1
4. Composition : More than 99%

Acrylonitrile Contains Traces of Acrylonitrile Inhibitor such as Methyhydroquinone as followings

1. Chemical Name : Methyhydroquinone
2. CAS. No. : 95-71-6
3. Composition : Less than 0.1%

Ⅳ. First Aid Measures

1. Eye Contact for Acrylonitrile

Immediately flush with lots of water for at least 15 minutes.
Then get immediate medical attention.

2. Skin Contact for Acrylonitrile

Wash skin with lots of water for at least 15 minutes
while removing contaminated clothing and shoes.
If needed, Get medical attention.
Completely clean and dry contaminated clothing before reuse.

3. Inhalation for Acrylonitrile

Take the inhaled person to safe area and remove from exposure to fresh air.
Use a bag valve mask or similar device to perform artificial respiration if not breathing.
Immediately get medical attention

4. Ingestion for Acrylonitrile

Contact local poison control center or physician immediately.
When vomiting occurs spontaneously, keep head lower than hips to prevent acrylonitrile form inhaling the lungs.
If person is unconscious, never make him vomit or drink anything.
If person is unconscious, turn head to side.
Get medical attention immediately.

5. Delayed and immediate effects

○ Inhalation
- Short Term Exposure
: irritation, itching, nausea, vomiting, diarrhea, stomach pain, irregular heartbeat, headache, drowsiness, dizziness, bluish skin color, suffocation, convulsions, coma, dyspnea, blood disorders
- Long Term Exposure : digestive disorder, reproductive effects, cancer

○ Skin Contact Exposure
- Short Term Exposure
: irritation (possibly severe), allergic reactions, blisters, suffocation, same as effects reported in Short Term Exposure, possibly absorbable.
- Long Term Exposure : same as effects reported in Short Term Exposure

○ Eye Contact
- Short Term Exposure : Burns
- Long Term Exposure : same as effects reported in Short Term Exposure

○ Ingestion
- Short Term Exposure : suffocation, same as effects reported in Short Term Inhalation
- Long Term Exposure : reproductive effects, cancer

6. First Aid and Note to Physician

For inhalation, break an amyl nitrite ampule(0.2ml) in a cloth and hold ampule lightly under nose for 30 seconds. Repeat inhalation of amyl nitrite at about 30 second intervals. Resume oxygen between amyl nitrite. Use a new amyl nitrite ampule every 5 minutes until directed otherwise by medical personnel.

If patient exhibits signs suggestive of cyanide poisoning following exposure, and has not responded to amyl nitrite, inject intravenously 10 milliliters of a 3% solution of sodium nitrite at a rate not greater than 2.5 to 5.0 milliliters per minute.
Consider oxygen.
Antidote : amyl nitrite, inhalation; sodium nitrite, intravenous; sodium thiosulfate, infusion; oxygen.

V. Fire Fighting Measures

1. Extinguishing Media

○ Adequate extinguishing media : regular dry chemical, carbon dioxide, water, regular foam alcohol resistant foam

○ Inadequate extinguishing media : None

○ Large Fire : Use regular foam or flood with fine water spray.

2. Specific Hazards Arising from the chemical

○ pyrolysis product
cyanide compounds
nitrogen oxide

○ Fire and Explosion Hazards.
Severe fire hazard.
Vapor/Air Mixtures are explosive.
Vapor may cause evaporating combustion
May be polymerize.
Containers may rupture or explode.
May explode when the closed container in acrylonitrile is heated.

3. Fire Fighting

Do not get water inside container
Cool containers with water spray until well after the fire is out.
Stay away from the ends of tanks.
For fires in cargo or storage area:
Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out.
If this is impossible, then take the following precautions:
Keep unnecessary people away, isolate hazard area and deny entry.
Let the fire burn.
Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire.
For tank, rail car or tank truck, evacuation radius : 800 meters (1/2 mile).
Water may be ineffective.

Ⅵ. Accidental Release Measures

1. Personal Precautions and Protective equipment

Avoid heat, flames, sparks and other sources of ignition.

Do not touch spilled material.

Stop leak if possible without personal risk.

Reduce vapors with water spray.

2. Environmental precautions

○ Air : N/A

○ Soil : N/A

○ water : Keep out of water supplies and sewers.

3. Methods for containment and cleaning up

○ Small spills: Flood with water.

○ Large spills: Dike for later disposal.

Remove sources of ignition.

Keep unnecessary people away, isolate hazard area and deny entry.

Notify local government, local environmental office, police station, fire station, or local labor authority.

Minster of Environment distributes the report to other organizations.

Ⅶ. Handling & Storage Information

1. Safe Handling Information : N/A

2. Safe Storage Information

Protect from physical damage.

Store outside or in a detached building.

Store with flammable liquids.

Keep separated from incompatible substances.

Monitor inhibitor content.

Secure to prevent tipping.

Use diking sufficient to contain total contents plus 10%.

Ⅷ. Exposure Control & Personal Protection

1. Exposure Limit

○ Korea Regulation : TWA-2ppm, 4.5㎎/㎥

○ ACGIH Regulation : TLV-TWA - 2ppm

○ Biological Exposure limit : N/A

2. Adequate Exposure Control

Provide local exhaust or process enclosure ventilation system.

Ensure compliance with applicabe exposure limit.

3. Personnel Protective Equipment

○ Respirator :

Respirator must be complete examination of KOSHA("안" mark)

- The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

1) If exposure amount is maximum 20 ppm, wear the following respirator.

Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s).

Any supplied-air respirator with a full facepiece.

2) If exposure amount is maximum 100 ppm, wear the following respirator.

Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s).

Any supplied-air respirator with a full facepiece.

Any self-contained breathing apparatus with a full facepiece.

3) If exposure amount is maximum 4000 ppm, wear the following respirator.

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.

- For Unknown Concentrations or Immediately Dangerous to Life or Health

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

- Escape

Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s).

Any self-contained breathing apparatus.

○ Eye Protection :

Wear splash resistant safety goggles with a facepiece.

Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

○ Gloves:

Wear appropriate chemical resistant gloves.

○ Clothing :

Wear appropriate chemical resistant clothing.

IX. Physical and Chemical Properties

1. Physical State : colorless liquid
2. Oder : pungent odor
3. Odor Threshold : 13-19 ppm
4. pH : not available
5. Freezing Point : -84 ~ -83℃
6. Boiling Point : 77 ~ 79℃
7. flash point : -1.1℃
8. Evaporation Rate : 4.5(butyl acetate=1)
9. Flammability(solid, gas) :
10. upper/lower limit in Flammable or Explosion Range : 17%~3%
11. Vapor Pressure : 109㎜Hg (at 25℃)
12. Solubility : 1.35%(water)
13. Vapor Density : 1.83(air=1)
14. Specific Gravity : 0.8060(Water=1)
15. n-Octanol/Water distribution coefficient : 0.25
15. Spontaneous Combustion Temperature : 481℃
16. Dissolution Temperature : not available
17. Viscosity : 0.34cP (at 25℃)

X. Stability and Reactivity

1. Chemical Stability
 - May polymerize violently or explosively.
 - May explode if heated in closed container.
2. Possibility of hazardous reactions
 - May polymerize violently or explosively.
 - Avoid contact with curing agents, accelerators, and/or initiators.
3. Conditions to Avoid
 - Avoid heat, flames, sparks and other sources of ignition.
 - Avoid contact with Plastics or rubber.
 - Containers may rupture or explode if exposed to heat
 - Minimize contact with material.
 - Keep out of water supplies and sewers.
4. Substance to aviod
 - Incompatibilities : acids, metals, amines, bases, halogens, peroxides, combustible materials, oxidizing materials
5. Hazardous decomposition
 - Thermal decomposition products : cyanide compounds , nitrogen oxide

XI. Toxicolgical Information

1. Information on the likely route of exposure.

○ Inhalation : irritation, itching, nausea, vomiting, diarrhea, stomach pain, irregularheartbeat, headache, drowsiness, dizziness, bluish skin color, suffocation, convulsions, coma, dyspnea, blood disorders

○ Swallow : suffocation, same as effects reported in inhalation

○ Skin Contact : irritation (possibly severe), allergic reactions, blisters, suffocation, same as effects reported in inhalation , possibly absorbable

○ Eye Contact : burns

2. Delayed and immediate effects and also chronic effects from short and long term exposure :

○ Acute Toxicity :
 - Oral : LD50 = 72 mg/kg (EHC 28 (1983)) (rat)
 - Skin : LD50 = 148 mg/kg (EHC 28 (1983)) (rat)
 - Inhalation : LC50 (4Hr) = 0.47 mg/L (EU-RAR No.32 (2004)) (rat)

○ Skin Corrosion/irritation : Category 2
Since erythema, edema was observed in the rabbit skin irritation test(EU-RAR No.32,3004), Draize Score 3.6

○ Serious eye damage/irritation : Category 2A
Since some data of toxic test (EU-RAR No.32,3004) suggested that it causes serious eye irritation,

○ Respiratory Sensitization : N/A

○ Skin Sensitization : Category 1
Since positive reaction was observed in guinea pig maximization test (CICAD 39 (2002))

○ Carcinogenicity : Category 1B

Korea Ministry of Labor (2002) A2, NTP (2005) R, IARC (2005) Group 2B, ACGIH (2006) A3, EU REACH law (2006) grade 2

○ Germ Cell Mutagenicity : Category 2

According to CERI-NITE Hazard Assessment No.64(2003), CICADS 39(2002), EU-RAR No.32(2004), negative in heritable mutagenicicy testing, no data in germ cell in vivo mutagenecity testing, positive in somatic cell in vivo mutagenicity testing, negative in germ cell in vivo genotoxicity testing

○ Reprodutive toxic : Category 2

Based on the evidence of organ and skeletal malformations in offspring at dosing levels toxic to dams in rat teratogenicity tests, described in CERI-NITE Hazard Assessment No. 64 (2003).

○ Specific Target Organ Systemic Toxicity (Single Exposure) : Category 1(nerves system, liver), Category 3(respiratory tract irritation, narcotic effects).

slight jaundice, spasm in human (CERI-NITE Hazard Assessment No.64 (2003)),effects in central nerve system, liver (CICAD 39 (2002)), eyes, nose, neck irritation, convulsions, coma, apnoea (NICNAS (2000)) etc.

○ Specific Target Organ Systemic Toxicity (Repeated Exposure) : Class 1(nerves system, respiratory, blood system, spermary, kidney, liver)

, headache, nerves breakdown etc. nerves system symptoms (CERI hazard data 96-3 (1997)), eye pain of nose, neck, airway (CERI-NITEhazard assessment No.64 (2003)), hemoglobin concentration·erythrocyte count·leukocyte count fall, immunodepression (EU-RAR No.32 (2004))

○ aspiration hazard : N/A

3. Numerical measures of Toxicity (such as acute toxicity estimates) : N/A

Ⅻ. Ecological Information

1. Aquatic Terrestrial Ecological Toxicity
   ○ Fish : N/A
   ○ Crustacean : Crustacean (Mysid Shrimp) 96hr LC50 = 5.81 mg/L (CERI-NITE Hazard Assessment) (2005))
   ○ Algae : N/A
2. Persistence and Degradability
   ○ Persistence : N/A
   ○ Degradability : 96% Degradability by BOD (Existed MSDS), log Kow = 0.25 (PHYSPROP Database (2005))
3. Bioaccumulative Potential
   ○ Biodegradability : N/A
   ○ Accumulation : N/A
4. Mobility in soil : N/A
5. Other adverse effects : N/A

XIII. Disposal Considerations

1. Disposal Methods
   - Dispose in accordance with all applicable regulations
   - U.S. disposal regulations : U.S. EPA 40 CFR 262.
   - Hazardous Waste Number(s) : U 009.
2. Disposal Considerations

N/A

XIV. TRANSPORT INFORMATION

1. UN Number : 1093
2. UN Proper Shipping Name : Acrylonitrile, Inhibited
3. Transport Hazard Class : 3
4. Packing Group, if applicable : 1
5. Marine Pollutant : applicable
6. Special Precautions , which a user needs to be aware of, or needs to comply with in connection with transport :

○ In case of fire, emergency procedures class : F-E
○ In case of spills, emergency procedures class : S-D

XV. Regulatory Information

1. Regulation for Korea Industrial Safety and Health Act
   : Work Environment Measurement Required Substance, Regulated Substance, Specially Controlled Substance
2. Regulation of Korea Toxic Chemicals Control Act
   : Accident Precaution Chemical, Toxic Chemicals
3. Regulation for Korea Fire Services Act
   : Category Ⅵ Petrochemical Class 1(Water-Insoluble liquids),200 liter
4. Korea Wastes Control Act : N/A
5. Other Country Regulation

○ Persistent Organic Pollutants Administration Law : N/A
○ EU classification information
- Firm classfication results :
  F; R11
  Carc. Cat. 2; R45
  T; R23/24/25
  Xi; R37/38-41
  R43
  N; R51-53
- Hazard statement : R45, R11, R23/24/25, R37/38, R41, R43, R51/53
- Precautionary measures tatement : S9, S16, S53, S45, S61

○ U.S. Regulations
- OSHA Regulation (29CFR1910.119) : N/A
- CERCLA 103 Regulation (40CFR302.4) : 45.3599(kg) 100(lb)
- EPCRA 302 Regulation (40CFR355.30) : 4535.99(kg) 10000(lb)
- EPCRA 304 Regulation (40CFR355.40) : 45.3599(kg) 100(lb)
- EPCRA 313 Regulation (40CFR372.65) : Available

○ Rotterdam Convention substance: N/A
○ Stockholm Convention substance : N/A
○ Montreal Protocol substance : N/A

XVI References

The References are provided as followings.

(1) ICSC
(2) EHC
(3) HSDB
(4) EU-RAR No.32
(5) CICAD
(6) Korea Ministry of Labor
(7) NTP
(8) IARC
(9) ACGIH
(10) EU REACH Law
(11) NICNAS
(12) CERI Hazard Data 96-3
(13) CERI-NITE Hazard Assessment
(14) SIDS Initial Assessment of Existing Chemicals
(15) PHYSPROP Database